

### **REMARKS/ARGUMENTS**

This Amendment is in response to the final Office Action mailed June 28, 2006 in the above-identified application. Based on the foregoing amendments and the following remarks, careful reconsideration and allowance of the application are respectfully requested.

Claims 1-25 remain pending in this application. By this Amendment, claims 1, 9, 12, 13, 17, 18, and 25 have been amended in order to more particularly point out the invention.

Applicants thank the Examiner for indicating claims 15 and 16 contain allowable subject matter. However, based on the foregoing amendments and following remarks, Applicants respectfully submit all the pending claims are now in condition for allowance.

The Examiner rejected claim 17 under 35 USC §102(b) as being anticipated by Raspagliesi et al (US 5,144,143, hereinafter "Raspagliesi"). The Examiner rejected claims 1-6, 8-14 and 18-25 under 35 USC §103(a) as being unpatentable over Murto (US 6,356,026) in view of Raspagliesi. The Examiner also rejected claim 7 under 35 USC §103(a) as being unpatentable over Murto in view of Raspagliesi and in further view of Seidl (US 4,783,595). Applicants respectfully traverse all these rejections.

### **35 USC §102 Rejection**

Claim 17 was rejected under 35 USC §102(b) as being anticipated by Raspagliesi. Turning to claim 17, Applicants' amended claim 17 requires "supporting the cathode having an outer periphery and an interior area by a rod fixedly attached to the interior area of the cathode which avoids gas introduction and high pressure near the rod; bombarding the cathode with electrons from a filament positioned outside an arc chamber of the ion source for heating of the cathode; and emitting electrons from the cathode for collision with gas molecules within the arc chamber to produce ions for implantation." (Emphasis added.) No new matter has been entered and support can be found throughout the specification including, but not limited to, FIG. 1 and Paragraph [0045] of Applicants' Patent Application Publication US 2001/0043040. For example, Applicants' FIG. 1 illustrates one embodiment where a cathode 20 is supported by a rod 150 fixedly attached to an interior area of the cathode 20. A filament 30 is positioned outside the arc chamber 14, and electrons from the cathode 20 collide with gas molecules within the arc chamber 14 to produce ions for implantation.

Raspagliesi teaches a filament 20 positioned inside the arc chamber 15 (see FIGs. 1 and 3 of Raspagliesi and Column 2, line 67 to Column 3, line 2). The filament 20 emits electrons within the arc chamber 15 and in response, “the extraction or sputtering of atoms of the metal [24]” occurs. Column 4, lines 2-3.

“These atoms are in turn ionized by the electrons emitted by the filament 20, in turn accelerated towards the walls of the casing 30. The positive ions of metal [24] which have been formed in this way are then extracted from the arc chamber through the aperture 36 of the cover 38, thanks to the negative extraction potential applied between the walls 30 of the chamber itself and ground, to be accelerated and lastly implanted into the semiconductor to be doped.” (Emphasis added.) Column 4, lines 3-12.

Therefore, Raspagliesi does not disclose, teach, or suggest “a filament positioned outside an arc chamber” as required by claim 17. Rather, Raspagliesi discloses a filament 20 positioned inside an arc chamber 15. Furthermore, Raspagliesi does not disclose, teach, or suggest “emitting electrons from the cathode for collision with gas molecules within the arc chamber to produce ions for implantation” as required by claim 17. Rather, Raspagliesi discloses emitting electrons from the filament 20 that collide with atoms from the high melting point metal 24 to produce ions for implantation. The metal 24 is a source of atoms that are ionized for implantation, and not a cathode for emitting electrons “for collision with gas molecules within the arc chamber to produce ions for implantation” as required by claim 17. Since Raspagliesi does not disclose a cathode, it does not also disclose, teach, or suggest “supporting the cathode having an outer periphery and an interior area by a rod fixedly attached to the interior area of the cathode” as is also required by claim 17.

### **35 USC §103 Rejections**

Claims 1-6, 8-14 and 18-25 were rejected under 35 USC §103(a) as being unpatentable over Murto in view of Raspagliesi. The Examiner admits that Murto does not disclose “a support rod fixedly attached to the interior area of the indirectly heated cathode” as is required by claim 1. Rather, the Examiner relies on Raspagliesi to provide this missing teaching indicating that Raspagliesi teaches a “support rod (23) fixedly attached to the interior area of the cathode (24) for the purpose of achieving a high melting point for the ionization of the metals.” Page 3, paragraph 4 of the Office Action mailed June 28, 2006.

Applicants' amended claim 1 requires "an indirectly heated cathode having an outer periphery and an interior area; and a support rod fixedly attached to the interior area of the indirectly heated cathode for supporting the cathode within an arc chamber of the ion source and avoiding gas introduction and high pressure near the support rod, the indirectly heated cathode configured to emit electrons within the arc chamber that collide with gas molecules within the arc chamber to produce ions for implantation." (Emphasis added.) No new matter has been entered and support can be found throughout the specification including, but not limited to, FIG. 1 and Paragraph [0045] of Applicants' Patent Application Publication US 2001/0043040.

As admitted by the Examiner, Murto does not disclose a support rod "fixedly attached to the interior area of the indirectly heated cathode" as required by claim 1. Rather, Murto teaches that sides 72s of the cathode 72 (see Murto's FIGs. 5 and 6) are attached to an outer periphery of the cathode.

As explained in the Background section of Applicants' published Application, "[k]nown prior art indirectly heated cathode designs utilize a cathode in the form of a disk supported at its outer periphery by a thin wall tube of approximately the same diameter as the disk." (Emphasis added.) Paragraph [0006], lines 5-8 of Applicants' Patent Application Publication US 2001/0043040. However, drawbacks with this type of cathode support are that the tube "has a large surface area, much of it at high temperature. This area loses heat by radiation, which is the primary way that the cathode loses heat." Paragraph [0007], lines 2-4 of Applicants' Patent Application Publication US 2001/0043040. In addition, the "large diameter of the tube increases the size and complexity of the structure used to clamp and connect to the cathode." Paragraph [0007], lines 4-6 of Applicants' Patent Application Publication US 2001/0043040.

Applicants respectfully submit that Raspagliesi does not provide the missing teachings of Murto for similar reasons earlier adduced regarding claim 17. In particular, Raspagliesi teaches a high melting point metal 24 to be ionized. Atoms from the high melting point metal 24 are ionized by collisions with electrons from the filament 20. The positive ions of the metal 24 formed in this way are then extracted from the arc chamber and implanted into a semiconductor to be doped. See Column 4, lines 3-12.

Nowhere does Raspagliesi teach, disclose, or suggest "an indirectly heated cathode having an outer periphery and an interior area; and a support rod fixedly attached to the interior area of the indirectly heated cathode for supporting the cathode within an arc chamber of the ion

source and avoiding gas introduction and high pressure near the support rod, the indirectly heated cathode configured to emit electrons within the arc chamber that collide with gas molecules within the arc chamber to produce ions for implantation” as is required by claim 1.

(Emphasis added.) The element 24 taught by Raspagliesi is a metal to be ionized, not an “indirectly heated cathode configured to emit electrons within the arc chamber that collide with gas molecules within the arc chamber to produce ions for implantation” as required by claim 1.


Accordingly, Applicants respectfully submit that claim 1 is allowable. Claims 2-8 depend directly or indirectly from claim 1 and are allowable for at least the same reasons as claim 1. Independent claims 9, 12, 13, 18, and 25 contain similar limitations (a support rod fixedly attached to the interior area of the cathode and the cathode configured to emit electrons) and are allowable for at least the same reasons as claim 1. Claims 10 and 11 depend from claim 9 and are allowable for at least the same reasons as claim 9. Claims 14-16 depend directly or indirectly from claim 13 and are allowable for at least the same reasons as claim 13. Claims 19-24 depend directly or indirectly from various independent claims are allowable by virtue of at least their dependency.

In particular regarding claims 10 and 11, both claims 10 and 11 also require that the “filament is disposed around the support rod.” In contrast, the filament 70 of Murto is disposed within an interior volume 72i created by the portions 72s and 72er of the cathode 72 (Column 6, lines 43-44 of Murto), and is not disposed around a support rod as required by claims 10 and 11.

Claim 7 was rejected under 35 USC §103 as being unpatentable over Murto in view of Raspagliesi and further in view of Seidl. Claim 7 depends from claim 5, which depends from claim 4, which itself depends indirectly from claim 1. Claim 7 is allowable over Murto and Raspagliesi for at least the same reasons as claim 1 earlier detailed. In addition, Seidl does not provide the missing teachings of Murto and Raspagliesi. Seidl does not teach an indirectly heated cathode and thus fails to cure the deficiencies of Murto and Raspagliesi. Furthermore, Seidl fails to disclose, teach, or suggest a “spring loaded clamp for holding the support rod” for an indirectly heated cathode as required by claim 7. Rather, the spring 7 of Seidl is part of a compression assembly 25 for pressing the ion-emission surface 22 of the ion-emission pellet 1 against an electrically-conducting beam forming electrode 4. Column 8, lines 32-35, and lines 44-47.

Accordingly, Applicants respectfully submit that in light of the foregoing claim amendments and remarks all of the presently pending claims in condition for allowance. Reexamination and reconsideration are respectfully requested. Early allowance is earnestly solicited. In the event the Examiner deems personal contact desirable in disposition of this application, the Examiner is respectfully requested to call the undersigned attorney. Please charge any additional fees or credit any overpayments to deposit account No. 50-0896.

Respectfully submitted,  
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